Inocula selection in microbial fuel cells based on anodic biofilm abundance of Geobacter sulfurreducens - DTU Orbit (09/11/2017)

Inocula selection in microbial fuel cells based on anodic biofilm abundance of *Geobacter sulfurreducens*

Microbial fuel cells (MFCs) rely on microbial conversion of organic substrates to electricity. The optimal performance depends on the establishment of a microbial community rich in electrogenic bacteria. Usually this microbial community is established from inoculation of the MFC anode chamber with naturally occurring mixed inocula. In this study, the electrochemical performance of MFCs and microbial community evolution were evaluated for three inocula including domestic wastewater (DW), lake sediment (LS) and biogas sludge (BS) with varying substrate loading (L_{sub}) and external resistance (R_{ext}) on the MFC. The electrogenic bacterium *Geobacter sulfurreducens* was identified in all inocula and its abundance during MFC operation was positively linked to the MFC performance. The LS inoculated MFCs showed highest abundance (18% ± 1%) of *G. sulfurreducens*, maximum current density [Imax = (690 ± 30) $mA \cdot m^{-2}$] and coulombic efficiency (CE = 29% ± 1%) with acetate as the substrate. Imax and CE increased to (1780 ± 30) $mA \cdot m^{-2}$ and 58% ± 1%, respectively, after decreasing the R_{ext} from 1000 Ω to 200 Ω, which also correlated to a higher abundance of *G. sulfurreducens* (21% ± 0.7%) on the MFC anodic biofilm. The data obtained contribute to understanding the microbial community response to L_{sub} and R_{ext} for optimizing electricity generation in MFCs.

General information

State: Published
Organisations: Department of Chemical and Biochemical Engineering, Center for BioProcess Engineering, Technical University of Denmark, Swedish University of Agricultural Sciences
Authors: Sun, G. (Intern), Rodrigues, D. D. S. (Ekstern), Thygesen, A. (Intern), Daniel, G. (Ekstern), Fernando, D. (Ekstern), Meyer, A. S. (Intern)
Pages: 379-387
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: Chinese Journal of Chemical Engineering
Volume: 24
Issue number: 3
ISSN (Print): 1004-9541
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.404 SNIP 0.741 CiteScore 1.37
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.502 SNIP 1.111 CiteScore 1.61
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.56 SNIP 1.195 CiteScore 1.53
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.517 SNIP 1.197 CiteScore 1.4
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.545 SNIP 1.132 CiteScore 1.29
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.514 SNIP 1.07 CiteScore 1.36
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.493 SNIP 0.747
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.414 SNIP 0.775
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.265 SNIP 0.569
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.278 SNIP 0.528

Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.305 SNIP 0.568
Scopus rating (2005): SJR 0.245 SNIP 0.605
Scopus rating (2004): SJR 0.225 SNIP 0.735
Scopus rating (2003): SJR 0.319 SNIP 0.424
Scopus rating (2002): SJR 0.187 SNIP 0.368
Scopus rating (2001): SJR 0.299 SNIP 0.545
Scopus rating (2000): SJR 0.211 SNIP 0.362
Scopus rating (1999): SJR 0.2 SNIP 0.446
Original language: English
Anode polarisation resistance, Coulombic efficiency, Denaturing gradient gel electrophoresis, Geobacter sulfurreducens, Lake sediment
DOIs:
10.1016/j.cjche.2015.11.002
Source: FindIt
Source-ID: 277430317
Publication: Research - peer-review › Journal article – Annual report year: 2016